CiRRUS Unit Heaters

Installation, Operation & Maintenance Manual

IOM 90 Issue 1

SPC

Contents

1. General

1.1 Description

SPC CiRRUS unit heaters are hot water fan heaters specifically designed for use in industrial/ commercial environments. They are stand-alone heaters mounted at high level blowing a high velocity stream of air into the occupied environment. They must be supplied with a flow of low pressure hot water which transfers heat to the air blowing across the heat exchanger and adds heat to the space.

The units consist of a painted steel casing with a set of louvres for directing the outlet airstream.

A finned tube (coil) heat exchanger is fitted within the casing and an axial fan is fitted to the back/ top of the unit. The fan is directly coupled to a single phase EC (brushless DC) motor which blows air across the heat exchanger and out through the bank of louvres.

CiRRUS units are available in a range of sizes and the pertinent dimensions are shown in the diagram and table below.

Unit size	Ci5	Ci6	Ci7	Ci8
Weight (kg)	30	45	55	70
Int. vol. 2 row (l)	0.9	1.5	2.7	3.7
Int. vol. 3 row (l)	1.2	2.0	3.5	4.9
Int. vol. 4 row (l)	1.5	2.5	4.3	6.0
Power V/Ph/Hz	230/1/50	230/1/50	230/1/50	230/1/50
Fan type	Axial	Axial	Axial	Axial
Motor type	EC	EC	EC	EC
Connection type	BSP male taper	BSP male taper	BSP male taper	BSP male taper

Table 1. General specification

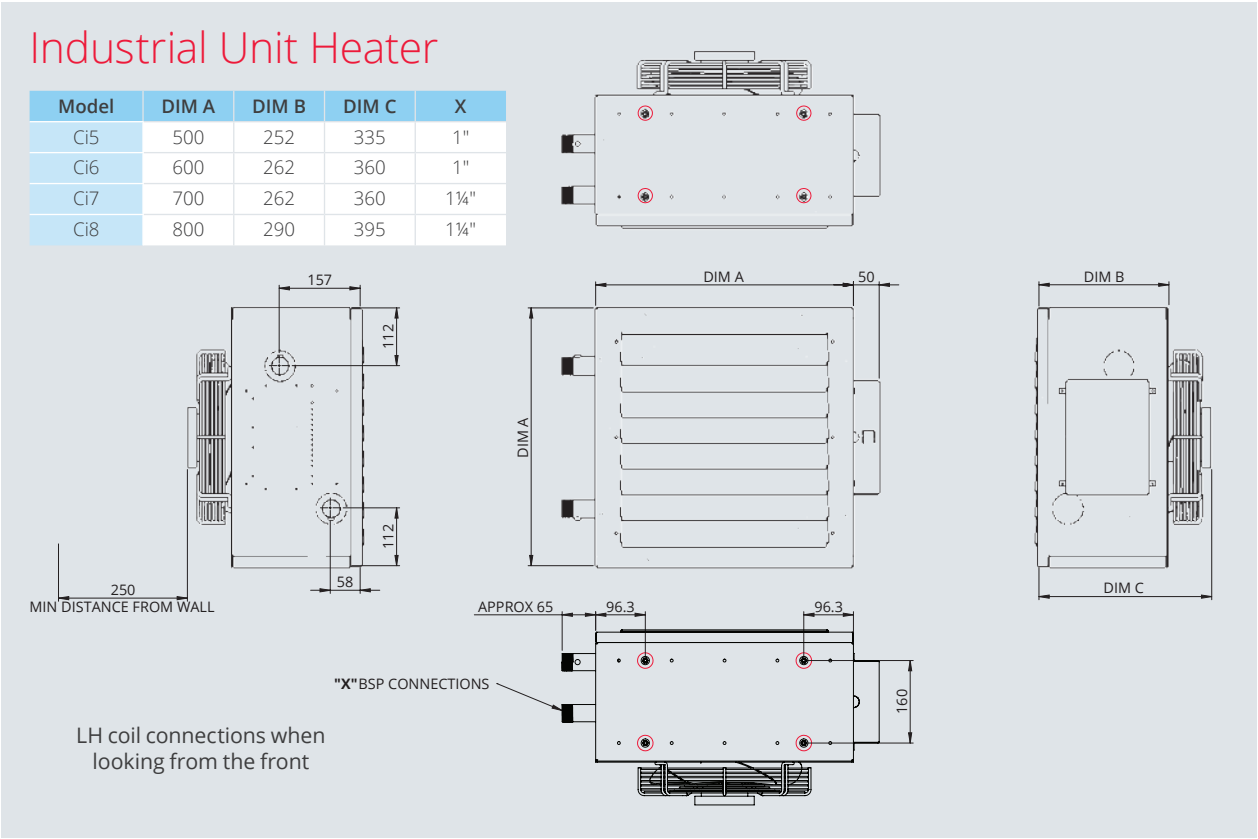


Figure 1. Major dimensions

1.2 Receipt and Preparation

The units are packaged and display the SPC works order number and site references where appropriate.

On receipt check that all details are correct to the schedules; any damages must be reported to the carrier and SPC immediately.

It is recommended that the packaging is kept in place and the units stored in a safe area until the necessary services are complete.

2. Mounting

2.1 Mounting general

Recommended minimum and maximum mounting heights are given in the table below and vary with the unit size and speed selected. Higher fan speeds suit higher mounting locations but do generate additional noise so the unit speed should always be matched as closely as possible to the appropriate mounting height.

In the table below the figures for throw apply to the zone of effectiveness of horizontally mounted units and the coverage applies to vertically mounted units. The heights shown are for guidance only and acceptable operation would still be expected at close to these values.

Unit size	Ci5			Ci6			Ci7			Ci8		
Speed	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Min. height (m)	2.0	2.5	2.5	2.5	2.5	3.0	2.5	3.0	3.0	2.5	3.0	3.5
Max. height (m)	3.0	3.5	3.5	3.5	4.5	4.5	3.5	5.0	5.5	4.0	5.0	6.0
Throw (m)	7	9	13	10	13	19	13	16	25	15	18	27
Coverage (mxm)	6	7	12	9	12	18	11	13	23	12	15	25

Table 2. Mounting heights

As unit heaters generate streams of warm air the outlet air is more buoyant than that of the surroundings and excessive leaving air temperatures can give rise to high temperature stratification within the space. Ideal leaving air temperatures for unit heaters are in the range 30 to 45°C. The leaving air temperature (LAT) can be calculated from the output (kW), the airflow (m3/s) and the entering air temperature (EAT):

LAT(°C) = EAT(°C) + [output(kW) / airflow(m3/s) / 1.2]

The approximate noise levels for the unit heaters at their various speeds are shown in the table below. Unit heaters are intended to generate high velocity air streams and intended for installation in industrial environments so will always generate significant noise. The figures shown are representative sound pressure levels that would be expected at a distance of 3m from the outlet of the unit in the free field. Actual sound pressure levels will depend on the reverberant nature of the installation.

Unit size	Ci5			Ci6			Ci7			Ci8		
Speed	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
dBA	41	47	57	41	50	60	43	52	62	48	54	66

Table 3. Sound pressure levels

2.2 Mounting of horizontal units

Horizontal units blow a horizontal stream of air, typically from the side of the space into the building. They are equipped with an array of adjustable outlet louvres to angle the airstream downwards. The louvres are fully adjustable but recommended angles for the direction of the airstream are 30 to 45° from the perpendicular. If horizontal units are being mounted on both sides of the building then they are best fitted in a staggered pattern.

Units are supplied, as standard, with captive threaded inserts on the top, bottom and sides of the unit casing. These inserts are intended for the fixing of mounting brackets or Unistrutchannels. The unit heaters can be supplied with cantilever wall brackets as an optional extra. Bolts are supplied to secure the unit heater to the top of the cantilever bracket and the holes in the brackets are positioned to allow a suitable clearance between the wall and the back of the fan. Fixings between the brackets and the wall are not supplied and these are within the scope of the installer who must ensure that suitable anchors are fitted to the wall. Figure 2 below shows details of the angle bracket fixing method.

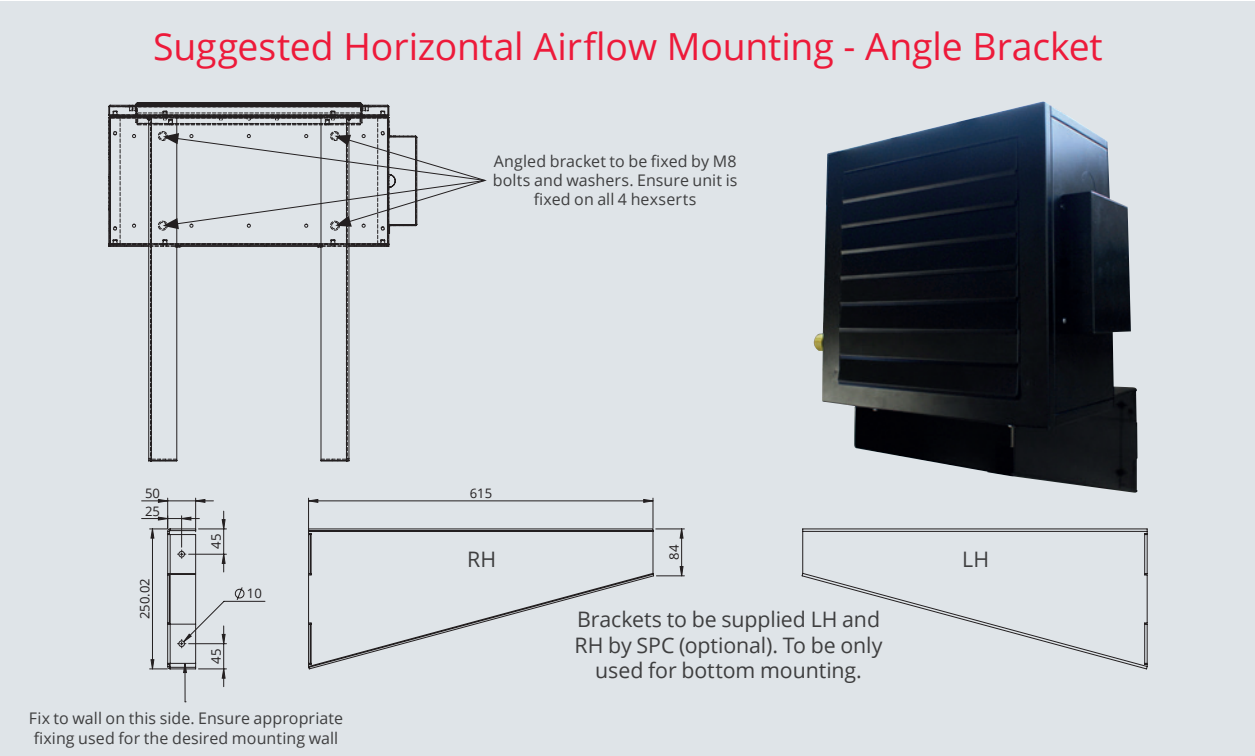


Figure 2. Wall angle bracket fixing

If horizontal unit heaters are not fixed using the angle bracket option then the captive inserts in the top/bottom of the casing can be used for fixing Unistrutchannels which can become a part of a custom hanging arrangement (Unistrutby others). Figure 3 below gives details.

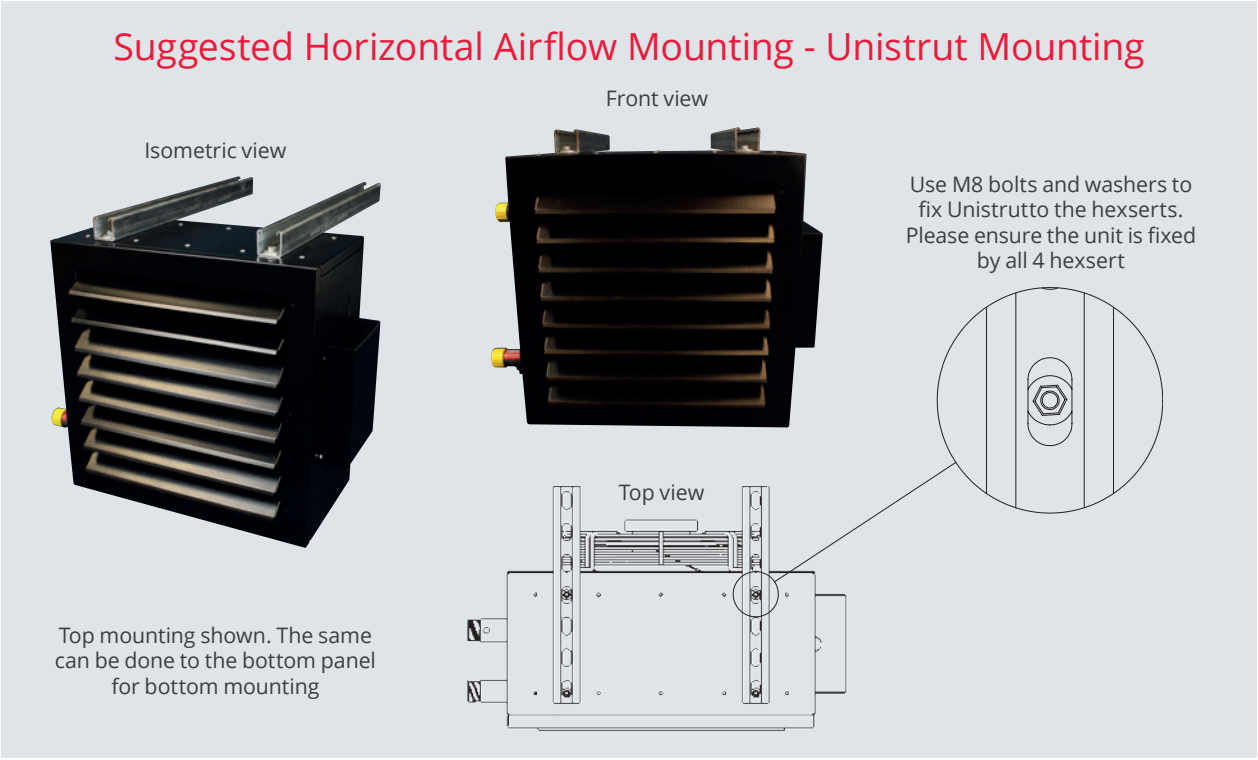


Figure 3. Horizontal unit Unistrutfitting

2.3 Mounting of vertical units

Vertical units are fitted with the fan at the top and the louvre array at the bottom of the unit so as to blow the stream of air vertically downwards. They are intended to be suspended from threaded bar and can be supplied with optional fixing brackets to facilitate this. This set of 4-off brackets screw into the captive inserts in the sides of the casing and provide a plain hole for the rod to be fixed to. The diagram below highlights the use of the vertical mounting brackets.

If custom mounting of the vertical units is used then the captive inserts in the casing can be used to affix unistrut, angle iron etc.

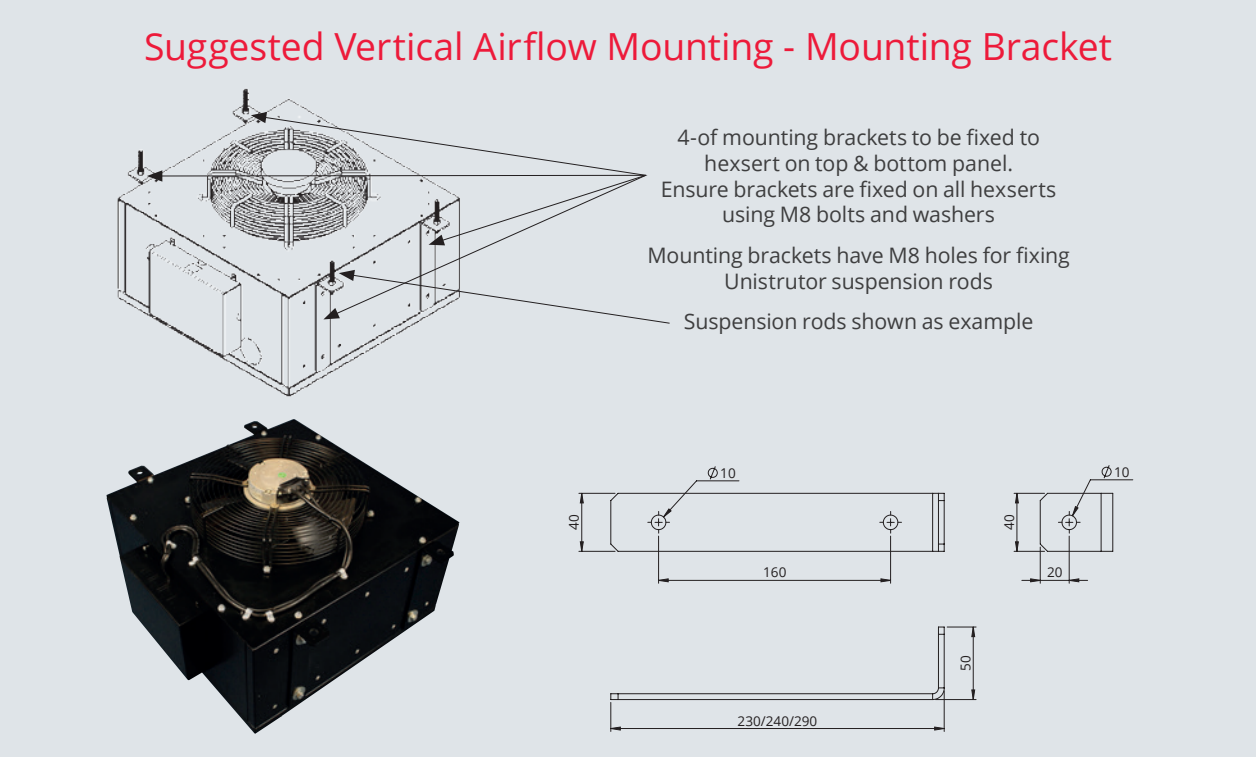


Figure 4. Vertical unit bracket and rod mounting

2.4 Fluid piping

The flow and return pipes penetrate the side of the unit casing at the top and the bottom. The flow connection is intended to be made on the leaving air face closest to the louvres and the return connection closest to the fan.

Connections are steel with a BSP male taper thread to the sizes shown in the dimensional sketch above. When tightening it is important that the connections are 'held-off' to prevent twisting and damage that would invalidate the warranty. The connections are complete with plugs for venting and draining the coil. If the coil is not at the top/bottom of the pipework systems then the installer will need to fit vents and drains in the pipework. An automatic air vent is often employed and fitted at the high point in the piping.

2.5 Wiring

All units incorporate high efficiency EC motors directly coupled to the fan. Power to the units is from a standard 230V/1Ph/50Hz supply and transformation and rectification is provided at the motor itself. The table below gives power draw data for the units at various speeds.

Unit size	Ci5			Ci6			Ci7			Ci8		
Speed	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Power draw (W)	70	110	200	90	150	300	100	180	380	230	420	700

Table 4. Electrical power draw

All wiring should be undertaken by a certified electrician in line with the latest version of the wiring regulations and the unit should be isolated prior to working on it or opening the terminal box. It is recommended that each unit be powered via a dedicated fused/switched spur. An earth connection must be provided as part of the power supply. The casing/electrical box can have holes cut in the sides to facilitate cable entry but suitable glands/grommets should be used.

A wiring diagram specific to the controls ordered with each unit is provided and all customer wiring should be made in line with this. Please contact SPC if the wiring diagram cannot be found; do not attempt to wire to the units without this diagram.

2.6 Control

A variety of control methods are available with CiRRUS unit heaters and these will have been arranged at the quotation/order stage. The wiring diagram that is supplied with the unit should be used and will refer to all the remote components that need to be wired in.

Manual control via a remote on/off switch is the simplest form of control though automatic control via remote mounted thermostat is also common. While fan speeds can be changed they would normally be set on the basis of the mounting height; in these cases the change speed switch would be unit mounted without straightforward access. If output modulation is used this is best achieved on the waterside – waterside control packages with valves, actuators and special 0 to 10V controllers are available. The valves are 2-port and can be fitted on either flow or return pipe to suit the installer's preference. Again, the wiring diagram supplied with the unit needs to be adhered to. The above controllers are capable of reacting to BACNET signals/protocols and if required then contact SPC for details.

3 Commissioning

Commissioning of CiRRUS units heaters involves the following:

- Check rotation of fan
- Check leaving air temperature
- Check operation of any controls
- Check no excessive and/or unexpected noise
- Check coil/pipework is properly vented

4 Maintenance

To ensure effective and safe operation of the unit heaters they should be subject to periodic inspection and cleaning. The outside of the case should be cleaned with a dry cloth; if liquids are used then they must not be allowed to contact the electrical box or the fan/motor. A vacuum or airline can be used to suck/blow and debris which is attached to the fins of the coil; the louvres should be fully opened in order to access the fin surfaces of the coil. The fan and basket guard can be cleaned in a similar manner with vacuum or compressed air. It is recommended that an inspection is made at least every 6 months though the rate at which cleaning is required will be largely determined by the nature of the environment.

The fans/motors contain sealed for life bearings and no lubrication is required.

Internal surfaces of the coil heat exchangers are a combination of copper and steel so common water additives suitable for use with these material can be included. Coil heat exchangers are factory pressure tested to 22 bar air under water so have a safe working pressure of up to 15 bar on standard low pressure hot water systems.

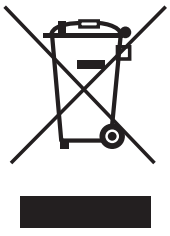
5 Fault finding

Below is a list of common faults and the steps required to resolve them:

Fault	Cause	Remedy
Fan not running	No power	Check electricity supply
	Fuse blown circuit breaker tripped	Check/change
	Controls	Check controls are not preventing fan from running
	Damaged fan/motor	Replace
Low leaving air temperature	Controls	Check controls are not preventing valves from opening
	No/low water flow and/or temperature	Check for good flow of hot water to unit and that there is no excessive temperature drop on the water side. High temperature drops indicate low water flow. Check temperature of water to the unit

6 Disposal

Units have a heat exchanger from copper tubes and aluminium fins. The units include fan assemblies from mixed materials and electrical components which should be disposed of separately in line with WEEE directives. It is not recommended that the units are disposed of with domestic waste but that the components are recycled as far as possible.



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